industries and distribution of population in Australia. Principles therein discovered could then be applied to the more complex climatic environments of other parts of the world. For such a comparative purpose the book is well fitted. Thus, in discussing climatology Australian homoclimes, *i.e.* the climates, products, and types of people in corresponding climates elsewhere, are cited. A world map of Herbertson's natural regions revised for Australia is presented. This chapter is admirable as an essay on comparative human climatology. Many of its interesting points are discussed more fully in the article "Agricultural Climatology of Australia" of which an abstract is given elsewhere in this number of the *Review*.

Of considerable interest also are the chapter on "Aviation and Meteorology," based largely on his own and his aviator-students' experiences, and that on "The Origin of the Tropical Lows in Australia." The low-pressure areas here dealt with form as buds from the two foci of practically permanent low pressure in summer in northern Australia. Dr. Taylor thinks that broad "convection domes" of heated air build up over these regions and from time to time have their summits torn off by the northwest anti-trades aloft and that these warm masses, having been given an eddying motion while being detached, reduce the pressure in the strata below and thus bring about the establishment of separate cyclones. He thinks that this convection-dome theory is also adequate to explain the origin of those extra-tropical cyclones which bud off from the other major centers of convection of the world, *i. e.* the low-pressure "centers of action."

There are few portions of the book open to adverse criticism. As in most textbooks on meteorology, the chapter on clouds and their origin is unsatisfactory, chiefly because of its brevity. In explaining how clouds originate, the common method, by mixture, is not even mentioned.

Two appendixes show the "Topographic Control of Rain in S. E. Australia" and "Temperature and Rainfall Averages for Australian Towns." In the front cover is a workable solar-control model; at the end a full index. Illustrations to the number of 229, most of them drawn by the author, vivify the text.

CHARLES F. BROOKS

### PAPERS ON THE TIDES

W. B. DAWSON. **The Tides and Tidal Streams, with Illustrative Examples from Canadian Waters.** 43 pp.; diagrs., ills. Dept. of the Naval Service, Ottawa, Canada, 1920. 9½ x 6½ inches.

W. B. DAWSON. **Tidal Investigations: Results Deducible from the Tidal Observations.** Map. (Rept. of the Canadian Arctic Expedition, 1913–18, Vol. 10, Part C, pp. 3B–13 B.) Ottawa, 1920.

The first named paper treats the subject in a somewhat popular manner. It embraces the tide in general; the methods employed in the observations of tides and description of tidal curves; the causes of the tides; types of tides; the tides as modified by local conditions; and tidal streams as illustrated by Canadian examples. Attached to the paper are five plates illustrating the several types of tides as represented by observations at Canadian tidal stations.

Because of the scarcity of publications in English dealing with the subject of tides and tidal phenomena from the viewpoint of the layman, the present pamphlet is welcome. It is questionable, however, whether the treatment of the movements of sun and moon is not too detailed for the layman, and a like question might be raised as to the author's description of the types of tides. Furthermore, in describing tides he classifies them into three types—the synodic, the anomalistic, and the declinational. It is not certain that this classification will appear as clear to the layman as that of daily, semidaily, and mixed types.

The author calls attention to the scarcity of material dealing with the effect of wind on surface currents. In the observations made on currents in Canadian waters, where the tidal currents are generally of considerable magnitude, the current due to the wind is necessarily masked by the strong tidal effects. From this the impression might be gained that the effect of the wind in general is negligible; while, as a matter of fact, in localities where tidal currents are weak the current will generally set with the wind masking entirely the tidal effect.

The second paper covers the tidal investigations and results of the expedition (1914–1916) under the leadership of Mr. Vilhjalmur Stefansson.

Tidal observations in the Arctic regions have a value not only in extending our knowledge of the geographic distribution of the tides but also in helping to throw light on the theory of the existence of a large land mass in the Arctic, a deduction which was arrived at from scanty tidal observations.

The paper gives a concise report of the methods and results of tidal observations at ten places in the general region of Beaufort Sea, where tidal observations at best are meager, and is a welcome addition to the tidal literature of the Arctic. An appendix gives mean ranges and establishments and a map of the region showing the location of the tide gauges.

The report brings out the importance of accurate time for proper comparisons with other stations and in this respect will be valuable for the Arctic explorer, whose tidal observations are only incidental to the many varied subjects to which he must give attention. It is shown that, on account of the small range of the Arctic tides, observations should be made when possible at the time of spring tides and further that, with regard to general procedure in any future tidal observations in the Arctic regions, some permanent tidal station should be established for reference in the region and should be maintained during the time the explorations are in progress.

G. T. RUDE

## TOPOGRAPHIC DETERMINANTS OF ARTILLERY OPERATIONS

W. C. CLARK, compiler. **Heavy (Coast) Artillery: Orientation.** Revised. xv and 302 pp.; maps, diagrs., ills., bibliogr. Coast Artillery School, Fort Monroe, Va. 75 cents. 9 x 6 inches.

Batteries of heavy artillery are usually located several miles behind an army's front line and direct their fire at targets which are not visible from the gun positions. Under these conditions the fire must be controlled by precise topographic methods and based on accurate, large-scale topographic maps. The procedure of making the topographic determinations necessary for map firing is called *orientation*; and the present work on heavy artillery orientation was compiled by Major Clark as a textbook for use in the Coast Artillery School at Fort Monroe, Virginia, and in universities giving preliminary military training.

The representation of relief by the contour method, map scales and slope scales, the drawing of profiles, and the use of conventional signs are briefly but very effectively discussed. In a large measure the treatment is based on experience gained on the western front during the World War. Measurements are given in the metric system, and French maps and French methods receive special consideration. The use and care of surveying instruments and the construction and use of maps are explained in detail, this part of the work comprising nearly two-thirds of the total. The remaining chapters deal with problems falling particularly within the province of the artillery officer.

The text, which is based on articles contributed by instructors on the staff of the Coast Artillery School, is clearly written and well illustrated and will come measurably near achieving the purposes set forth at the close of the introduction, among which are the two following: "To give in a clear and concise form all the information necessary either for an orientation or a battery officer to solve the various problems of orientation that may arise in connection with a battery of heavy artillery executing map firing" and "to present the subject matter in a manner that will be intelligible to an officer who has had no training in civil engineering."

DOUGLAS JOHNSON

## RECENT BOOKS ON MAPPING AND SURVEYING

J. K. FINCH. **Topographic Maps and Sketch Mapping.** xi and 175 pp.; maps, diagrs., ills., bibliogr., index. John Wiley & Sons, Inc., New York, 1920. 9 x 6 inches.

W. L. WEBB and J. C. L. FISH. **Technic of Surveying Instruments and Methods.** xvi and 319 pp.; diagrs., ill. John Wiley & Sons, Inc., New York, 1917. $2.00. 6¾ x 4 inches.

C. B. BENSON. **Map Reading for Aviators, with a Chapter on Aerial Navigation.** 56 pp.; diagrs., ills. Edwin N. Appleton, Inc., New York, 1918. $1.00. 7 x 5 inches.

The keynote of "Topographic Maps and Sketch Mapping" is its directness and clarity of presentation. For this reason it should prove especially valuable for the introduction of the